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1 WHAT IS CLAIMED IS:

1. An IF receiver comprising:  
an amplifier for receiving an analog input signal and  
5 amplifying the received analog signal;  
an I-mixer coupled to the amplifier for down converting the  
input signal to a first lower frequency signal;  
a Q-mixer coupled to the amplifier for down converting the  
input signal to a second lower frequency signal;  
10 a channel selector filter coupled to the I-mixer and the Q-  
mixer for selecting a desired frequency channel for the first  
lower frequency signal for generating an I signal and selecting  
a desired frequency channel for the second lower frequency signal  
for generating a Q signal;  
15 an IF demodulator for receiving the I signal and the Q  
signal and extracting information from the input signal  
responsive to the I signal and Q signal; and  
a RC calibration for tuning the receiver.

20 2. The IF receiver of claim 1, wherein the IF demodulator  
comprises:  
a first IF differentiator for differentiating the I signal;  
a second IF differentiator for differentiating the Q signal;  
a cross-coupled multiplier for multiplying the  
25 differentiated I signal with the I signal and multiplying the  
differentiated Q signal with the Q signal to extract frequency  
information from the I signal and the Q signal; and  
a slicer for converting the frequency information to digital  
data.

30 3. The IF receiver of claim 2, wherein each of the first  
and second IF differentiators comprises:  
an operational amplifier for receiving an input signal and  
generating an output signal at an output node;

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1        a first resistor coupled in parallel between the output node  
and a negative input;

a capacitor coupled between the native input and the input signal; and

5           a second resistor coupled between the negative input and Q  
signal.

4. The IF receiver of claim 3, wherein frequency response  
for each of the first and second IF differentiators is defined  
10 by:

$$\frac{V_o}{V_i}(j\omega) = -jRC \left( \omega - \frac{1}{R_1 C} \right) \quad (1)$$

15 where  $V_o$  is the output signal,  $V_i$  is the input signal,  $R$ ,  $R_1$ ,  
and  $C$  are the values for the first resistor, the second  
resistor, and the capacitor respectively.

5. The IF receiver of claim 2, wherein the slicer comprises:

20           a peak detector for receiving an analog data input and a  
slow/fast signal for generating a peak signal responsive to peak  
of the analog data input signal;

a valley detector for receiving an analog data input and a  
slow/fast signal for generating a valley signal responsive to  
25 valleys of the analog data input signal;

an offset tracker coupled to the output of the peak detector and the output of the valley detector for taking the average of the peak signal and the valley signal; and

a comparator coupled to the output of the offset tracker and  
30 the analog data input for generating a high signal if the analog  
data input is higher than its average value, and generating a low  
signal if the analog data input is lower than its average value.

6. The IF receiver of claim 5, wherein the peak detector  
35 comprises:

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- 1 a capacitor driven by a current source;  
a first discharge current for discharging the capacitor  
selectable by a first switch; and  
a second discharge current for discharging the capacitor  
5 selectable by a second switch, wherein the first switch and the  
second switch are adaptively activated to selectively discharge  
the capacitor either in a fast discharge mode by the first  
discharge current or a slow discharge mode by the second  
discharge current.

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7. The IF receiver of claim 2, wherein the IF demodulator  
further comprises a band pass filter for shaping the I signal and  
the Q signal.

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8. The IF receiver of claim 1, further comprising:  
a first limiter for amplifying the I signal; and  
a second limiter for amplifying the Q signal.

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9. A method for demodulating an IF FSK signal comprising  
the steps of:

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receiving an IF I signal input and an IF Q signal input;  
differentiating the I signal at the frequency of the I  
signal by a first IF differentiator;  
differentiating the Q signal at the frequency of the Q  
signal by a second IF differentiator;  
multiplying the differentiated I signal with the I signal  
and multiplying the differentiated Q signal with the Q signal for  
extracting frequency information from the I signal and the Q  
signal; and

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converting the frequency information to digital data.

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10. The method of claim 9, wherein the step of  
differentiating the I signal comprises the step of applying a  
transfer function of

$$\frac{V_o}{V_i}(jw) = -jRC \left( w - \frac{1}{R_1 C} \right) \quad (1)$$

to the I signal.

11. The method of claim 9, wherein the step of differentiating the Q signal comprises the step of applying a transfer function of

$$\frac{V_o}{V_i}(jw) = -jRC \left( w - \frac{1}{R_1 C} \right) \quad (1)$$

to the Q signal.

12. The method of claim 9, wherein the step of converting the frequency information to digital data comprises the step of receiving an analog data input and a slow/fast signal for generating a peak signal responsive to peak of the analog data input signal;

receiving an analog data input and a slow/fast signal for generating a valley signal responsive to valleys of the analog data input signal;

taking the average of the peak signal and the valley signal; and

generating a high signal if the analog data input is higher than its average value, and generating a low signal if the analog data input is lower than its average value.

13. The method of claim 9, further comprising the step of amplifying the I signal and the Q signal.

14. An IF demodulator comprising:  
 a first IF differentiator for differentiating an I signal;  
 a second IF differentiator for differentiating a Q signal;  
 a cross-coupled multiplier for multiplying the differentiated I signal with the I signal and multiplying the

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1 differentiated Q signal with the Q signal to extract frequency  
information from the I signal and the Q signal; and  
a slicer for converting the frequency information to digital  
data.

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15. The IF demodulator of claim 14, wherein each of the  
first and second IF differentiators comprises:

an operational amplifier for receiving an input signal and  
generating an output signal at an output node;

10 a first resistor coupled in parallel between the output node  
and a negative input;

a capacitor coupled between the native input and the input  
signal; and

15 a second resistor coupled between the negative input and Q  
signal.

16. The IF demodulator of claim 15, wherein frequency  
response for each of the first and second IF differentiators is  
defined by:

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$$\frac{V_o}{V_i}(j\omega) = -jRC \left( \omega - \frac{1}{R_1 C} \right) \quad (1)$$

where  $V_o$  is the output signal,  $V_i$  is the input signal,  $R$ ,  $R_1$ ,  
and  $C$  are the values for the first resistor, the second  
25 resistor, and the capacitor respectively.

17. The IF demodulator of claim 14, wherein the slicer  
comprises:

30 a peak detector for receiving an analog data input and a  
slow/fast signal for generating a peak signal responsive to peak  
of the analog data input signal;

a valley detector for receiving an analog data input and a  
slow/fast signal for generating a valley signal responsive to  
valleys of the analog data input signal;

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1 an offset tracker coupled to the output of the peak detector  
and the output of the valley detector for taking the average of  
the peak signal and the valley signal; and

5 a comparator coupled to the output of the offset tracker and  
the analog data input for generating a high signal if the analog  
data input is higher than its average value, and generating a low  
signal if the analog data input is lower than its average value.

10 18. The IF demodulator of claim 17, wherein the peak  
detector comprises:

a capacitor driven by a current source;

a first discharge current for discharging the capacitor  
selectable by a first switch; and

15 a second discharge current for discharging the capacitor  
selectable by a second switch, wherein the first switch and the  
second switch are adaptively activated to selectively discharge  
the capacitor either in a fast discharge mode by the first  
discharge current or a slow discharge mode by the second  
discharge current.

20 19. The IF demodulator of claim 14, further comprising a  
band pass filter for shaping the I signal and the Q signal.

25 20. The IF demodulator of claim 14, further comprising a  
low pass filter for filtering noise.

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